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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/632,113	08/01/2003	Maki Ito	Q76707	3482

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EXAMINER	
MRUK, GEOFFREY S	

ART UNIT	PAPER NUMBER
2853	

DATE MAILED: 02/15/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/632,113	ITO, MAKI	
	Examiner	Art Unit	
	Geoffrey Mruk	2853	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *22 November 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-6* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-6* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *16 August 2004* is/are: a)☒ accepted or b)☐ objected t o by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *1/20/06*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

1. Claims 1, 2, and 4-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kim (US 6,256,849 B1) in view of Mukoyama (JP 404257446 A).

With respect to claim 1, the primary reference Kim discloses a liquid-jet head (Column 1, line 7) comprising:

- a passage-forming substrate (Fig. 15, elements 1, 7-9) on which pressure generating chambers (Fig. 15, element 1a) communicating with nozzle orifices (Fig. 15, element 10) are defined, and
- a piezoelectric element (Column 1, lines 18-21)) composed of a lower electrode (Fig. 15, element 3), a piezoelectric layer (Fig. 15, element 4) and an upper electrode (Fig. 15, element 5), which are provided on the passage-forming substrate while interposing a vibration plate (Fig. 15, element 2) there between, wherein,
- the lower electrode (Fig 15, element 3) is provided to extend from an area facing the pressure generating chamber (Fig. 15, element 1a) to an area facing

compartment walls (Fig. 15, array of element 1) which are present on both sides, in a width direction, of the pressure generating chambers,

- a cross section of the piezoelectric layer, when cut along the width direction, has a trapezoidal shape, both ends, in a width direction, of the piezoelectric layer at a pressure generating chamber side are positioned in a region facing the pressure generating chamber (Column 9, lines 10-14).

With respect to claim 4, the primary reference Kim discloses the pressure generating chambers (Fig. 15, element 1) are formed in a single crystal silicon substrate by anisotropic etching (Column 6, lines 36-38; Column 13, lines 58-67; Column 14, lines 1-4), and each layer of the piezoelectric element (Fig. 15, element 4) is formed by deposition and a lithography method (Column 14, lines 5-23).

With respect to claim 5, the primary reference Kim discloses the liquid-jet head (Column 1, line 7) according to any one of claims 1 to 4.

With respect to claim 6, the primary reference Kim discloses the lower electrode (Fig 15, element 3) extends beyond an area facing the pressure generating (Fig. 15, element 1a) chamber to an area facing compartment walls (Fig. 15, array of element 1), which are present on both sides, in a width direction, of the pressure generating chamber.

However, the primary reference of Kim fails to disclose:

- with respect to claim 1, a relationship between a width x of a portion of the piezoelectric layer provided on a lower electrode, the portion of the piezoelectric layer being located directly facing the lower electrode and at the pressure

generating chamber side, and a width y of the pressure generating chamber at the vibration plate side satisfies $0.75 \leq x/y \leq 1$ and

- with respect to claim 2, the width x of the piezoelectric layer at the pressure generating chamber side and the width y of the pressure generating chamber at the vibration plate side are equal.

The secondary reference Mukoyama discloses "The ratio of the width of the piezoelectric crystal element 30 to that of the pressure chamber 20 is within a range from 0.8 to 1.0" (English Abstract) and the width of the pressure generating chamber at the vibration plate side are equal (Fig. 3 and the range disclosed in the English Abstract).

Therefore, in view of the teachings of the secondary reference, one of ordinary skill in the art would have been motivated to modify the primary reference using the ratio of the width of the piezoelectric crystal element to that of the pressure chamber. The motivation for doing so would have been "so that ink drops are efficiently spouted" (English Abstract). The examiner makes of record the interpretation of the shape of the piezoelectric crystal element 30 and the pressure chamber 20 in the Mukoyama reference to be rectangular, making the opposite sides of each respective element equal.

2. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kim (US 6,256,849 B1) in view of Mukoyama (JP 404257446 A) as applied to claim 1 above, and further in view of Hashizume (JP 410286960 A).

Kim and Mukoyama references disclose all of the limitations of the liquid-jet head except the pressure generating chamber has a space portion, the space being provided at a periphery of an opening of the pressure generating chamber at the vibration plate side.

The tertiary reference Hashizume discloses the pressure generating chamber (Fig. 1, element 20) has a space portion (Fig. 1, element 8), the space being provided at a periphery of an opening of the pressure generating chamber at the vibration plate side (paragraph 0028).

Therefore, in view of the teachings of the tertiary reference, one of ordinary skill in the art would have been motivated to modify the primary reference using the taper-like attachment walls (Fig. 1, element 8). The motivation for doing so would have been "a high speed and the regurgitation of the ink held in the ink cavity 20 can be carried out in large quantities. Moreover, since the side attachment wall 8 has a taper structure, it can also prevent that distortion arises in the single crystal silicon substrate1" (paragraph 0029).

Response to Arguments

1. Applicant's arguments filed 22 November 2005 have been fully considered but they are not persuasive. The applicant's argument that "Specifically, when reviewing the Mukoyama reference, this reference teaches that there is a change in ink ejection voltage, not in accordance with the width of the piezoelectric active section but that of the piezoelectric element, and there is no description that at lease one of the upper and

lower electrodes is different in width from the piezoelectric layer" is not persuasive. However, as cited in the final action rejection and by applicant's remarks, Mukoyama states "Additionally, if the ratio of the width of the piezoelectric element 30 to that of the pressure chamber 20 is within a range from 0.8 to 1.0, it is most efficient to spout ink drops. Thus, a low voltage is enough to drive the ink jet recorder, and the costs for a circuit and a base plate can be suppressed low since it is possible to drive the recorder at a low driving voltage". Therefore, the primary reference of Kim in view of the secondary reference of Mukoyama meets the claimed limitations.

2. The applicant's argument that "Additionally, when reviewing the figures of Mukoyama, in which the entire piezoelectric element is shown, there is no evidence of discriminating between the upper electrode, the piezoelectric layer and the lower electrode. In light of this, the "piezoelectric element" in the reference Mukoyama is the "piezoelectric active section" which is a section where a displacement attributed to the ink ejection is caused" is not persuasive.

In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

3. The applicant's argument that "As an initial matter, Applicant notes that Hashizume fails to cure the deficient teachings of Kim and Mukoyama, and is thus allowable over the prior art, at least because of its dependence" is not persuasive.

However, as cited in the final action rejection, Hashizume states "as shown in drawing 1, the ink cavity 20 is formed in the part corresponding to the field in which the PZT film 4 of the single crystal silicon film 1 is formed" (paragraph 0026) and "this part consists of taper-like side attachment walls 8 which incline towards the outside of the ink cavity 20" (paragraph 0028). Clearly as shown in drawing 1, the PZT film 4 is within the taper-like side attachment walls 8 and therefore the ratio between the PZT film 4 and the taper-like side attachment walls 8 is less than 1 as taught by Mukoyama. Therefore, the primary reference of Kim in view of the secondary reference of Mukoyama, in further view of the tertiary reference of Hashizume meets the claimed limitations.

The examiner makes of record that the previous claim objections dated 14 September 2005 are withdrawn in view of applicant's remarks.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Geoffrey Mruk whose telephone number is 571 272-2810. The examiner can normally be reached on 7am - 330pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Meier can be reached on 571 272-2149. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

GSM
2/9/2006

GM

2/10/06
MANISH S. SHAH
PRIMARY EXAMINER